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10/572,616

10/18/2006

Raoul Florent

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS

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BRIARCLIFF MANOR, NY 10510

EXAMINER

BITAR, NANCY

ART UNIT

PAPER NUMBER

2624

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |                                       |  |
|------------------------------|--------------------------------------|---------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/572,616 | <b>Applicant(s)</b><br>FLORENT ET AL. |  |
|                              | <b>Examiner</b><br>NANCY BITAR       | <b>Art Unit</b><br>2624               |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 June 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 March 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

***Response to Arguments***

1. Applicant's response to the last Office Action, filed 3/17/2009, has been entered and made of record.
2. Applicant has amended claims 8. Claims 1-20 are currently pending.
3. Applicants arguments filed 06/17/2009 have been fully considered but they are not persuasive.
4. Applicant argues that Zlokolica fail to teach a filter that temporally filters one or more of the slices for differently filtering the slices according to the content wherein one or more high frequency slices are filtered at a greater rate than one or more low frequency slices.  
In response, examiner refers to Zlokolica where Zlokolica teaches the image processing system for reduction of the noise and enhancement of edges in images of a sequence, comprising: a decomposer that decomposes a spatial image signal yielding slices of different content , the decomposition being based on pyramidal decomposition( chapter 3, first two paragraphs );  
a filter that temporally filters one or more of the slices for differently filtering the slices according to the content wherein one or more high frequency slices are filtered at a greater rate than one or more low frequency slices and (chapter 2 and chapter 3 paragraph 3-9); a recomposer that recomposes the images of the sequence from at least the temporally filtered slices (chapter 3,

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last paragraph 3). It is true that Zlokolica does not explicitly teaches the one or more high frequency slices are filtered at a greater rate than one or more low frequency slices. However, it is generally known that the spatially slowly varying image content (i.e. image background) may be found in the lower spatial frequency subband whereas the noise is typically found in the higher spatial frequency subband. Thus, the typical approach in an edge preserving noise reduction approach is to split the input image signal into a low and high frequency subband and to filter only the high frequency subband prior to the signal recombination. Moreover, Zlokolica teaches in section 3 the use of different filter for the lower spatial frequency subband (equation 7) than the higher frequency subbands (section 3, page 6). Moreover, Examiner used a secondary reference to show the laplacian pyramid that contains the high pass fraction and the Gaussian pyramid contains the low pass fraction therefore, the input signal is split and when the high frequency subband is processed the lower spatial frequency subband is left intact.

All remaining arguments are reliant on the aforementioned and addressed arguments and thus are considered to be wholly addressed herein.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. Claims 1-3, 5-8, 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zlokolica ET al (Video denoising using multiple class averaging with multiresolution, University of Ghent, Belgium) in view of Eck et al ( US 2006/0072845)

As to claim 1, Vladimir Zlokolica et al. teaches an image processing system for reduction of the noise and enhancement of edges in images of a sequence, comprising: a decomposer that decomposes a spatial image signal yielding slices of different content , the decomposition being based on pyramidal decomposition( The wavelet transform compresses essential information in an image into relatively few large coefficients, that correspond to the main image details at different resolution scales, note that one level in the decomposition have been used for the sake of simplicity and time cost, page 5, section 3); a filter that temporally filters one or more of the slices for differently filtering the slices according to the content wherein one or more high frequency slices are filtered at a greater rate than one or more low frequency slices and (spatio-temporal recursive filter, based on multiple threshold filtering, see section 2 and section 3 equation (7) and figure 2); a recomposer that recomposes the images of the sequence from at least the temporally filtered slices (after all four bands HH,HL,LH and LL have been processed, an inverse wavelet transform is done which produces the output sequence , page 6, section 3). While Vladimir Zlokolica meets a number of the limitations of the claimed invention, as pointed out more fully above, Vladimir Zlokolica fails to specifically teach the differently filtering the slices according to the content wherein one or more high frequency slices are filtered at a greater rate than one or more low frequency slices. Specifically, Eck et al. teaches the use of Laplacian pyramid that leads to high frequency wherein The Laplacian pyramid representations .LAMBDA.sub.j are defined as the difference between the stages input representation and the copy thereof after passing through the reduction R and expansion E blocks. The "expansion" E here includes a resolution increase by the factor 2 (by inserting zeros) and a subsequent

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low-pass filtering (interpolation). In this case, 3.times.3 binomial filters are used for the low-pass filtering operations in the reduction R and the expansion E. The Laplacian pyramid representations .LAMBDA.sub.j accordingly contain the high-pass fraction and the Gaussian pyramid representations .GAMMA...sub.j contain the associated low-pass fraction of the resolution stage j ( paragraph[0013] and [0045-0047]; figure 1 and 6).It would have been obvious to one of ordinary skill in the art to use different filtering in Vladimir Zlokolica filtering process in order to reduce the noise in an input image I while at the same time maintaining the image details and the image sharpness. Therefore, the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention by applicant.

As to claim 2, Eck et al., teaches the system of claim 1 pyramidal decomposition is one of laplacian or Gaussian (The resolution of an input image into a Laplacian pyramid or Gaussian pyramid is frequently used in medical image processing and is particularly suitable for use on image strips, paragraph [0014])

As to claim 3, 13, and 18, Eck et al. teaches the system of claim 1 wherein the temporal filtering comprises adaptive filtering (in this method, which is referred to as MRGAF (Multi-Resolution Gradient Adaptive Filtering), paragraph [0004]).

As to claim 5, Vladimir Zlokolica et al. teach the system of claim 1 wherein the temporal filtering comprises recursive adaptive filtering (A time recursive spatio-temporal filter has been presented in this paper, see section 2 and section 5).

As to claim 6, 14, and 19, Vladimir Zlokolica et al. teaches the system of claim 1, further comprising a display device for displaying the images of the sequence ( video sequence, see section 1-2).

Claim 7 differ from claim 1 only in that claim 1 is a system claim whereas; claim 7 is a computer claim. Thus, claim 7 is analyzed as previously discussed with respect to claim 1 above.

Claim 8 differ from claim 1 only in that claim 1 is a system claim whereas; claim 8 is a method claim. Thus, claim 8 is analyzed as previously discussed with respect to claim 1 above.

As to claim 10, and 15, Vladimir Zlokolica et al., teaches applying laplacian pyramid decomposition to perform the decomposition of the spatial image signal (section 3, page 5; see also Eck et al figure 5)

As to claim 11 and 16, Vladimir Zlokolica teaches applying Gaussian pyramid decomposition to perform the decomposition of the spatial image signal (wavelet decomposition, page 6, figure 2, see also Eck et al paragraph [0044-0047]))

As to claims 12 and 17, Vladimir Zlokolica et al. teaches applying adaptive temporal recursive filtering to perform the temporal filtering of at least a portion of the slices ( adaptive filtering, 800, column 17, lines 45, column 18, lines 1-40; see also Eck et al figure 6).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to

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which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4, 9 and 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zlokolica in view of Eck et al and further in view of Brailean et al( Noise Reduction: Filters for Dynamic Image sequence: A Review) .

While Zlokolica and Eck et al. meets a number of the limitations of the claimed invention, as pointed out more fully above, Zlokolica fails to specifically teach the temporal filtering comprises motion compensation. Specifically, Brailean et al. teaches the motion compensated spatiotemporal filtering where the addition of motion compensation to a non motion compensated filter does result in a new filter which helps the temporal correlation (Page 1278-1281). It would have been obvious to one of ordinary skill in the art to include the motion compensation of Brailean in Zlokolica temporal filtering in order to allow for the support of the filter to be increased in the temporal direction improving the filter's ability to suppress noise without incurring additional artifacts due to motion(see section B: Motion Compensated Spatiotemporal ) Therefore, the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention by applicant.

### ***Conclusion***

**8. THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NANCY BITAR whose telephone number is (571)270-1041. The examiner can normally be reached on Mon-Fri (7:30a.m. to 5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nancy Bitar/  
Examiner, Art Unit 2624

/VIKKRAM BALI/

Supervisory Patent Examiner, Art Unit 2624